

THE NOTION OF MOTION

FOCUSED FIELD TRIP AT

THE IOWA
CHILDREN'S
MUSEUM



What's In My



Focused Field Trip Packet?

For Educators:

- Name Tags for all children and adults will be mailed with confirmation letter
- General Information about Focused Field Trips
- Overview of “Notion of Motion” Focused Field Trip
- Description of Activity Centers
- Iowa CORE Curriculum Standards Reflected in the Field Trip
- Pre-Visit Activities:
 - “Friction Ramp”
 - “Keep on Rolling”
- Post-Visit Activities:
 - “Make a Race Graph”

For Chaperones: Please copy and distribute to chaperones

- Museum Welcome Letter to Field Trip Chaperones

For Bus Drivers: Please copy and distribute to your bus drivers

- Coral Ridge Mall map to indicate parking areas

GENERAL INFORMATION

The Notion of Motion Focused Field Trip gives students an opportunity to explore the Notion of Motion Exhibit (closed to the public) while engaging in specially designed hands-on, minds-on activities with a Museum Educator that stimulate learning, creativity, and fun!

SPECIFIC FIELD TRIP INFORMATION

- Field Trip lasts 2 hours: 90 minutes focused activities in the Notion of Motion gallery, 30 minutes free exploration in the entire museum.
- Minimum group size is 10 children. Maximum size is 40 children.
- One adult chaperone must accompany every five children. Chaperones are required to stay with their small group during the free exploration portion of the field trip.
- Each student and adult must wear an ICM name tag.
- Classes need to be divided into four small groups before arrival at The Museum.
- Chaperones act as active small group leaders. It is very important for them to receive the enclosed chaperone materials and to come prepared.

The Notion of Motion Focused Field Trip offers students hands-on opportunities to learn about the physics of moving objects. Balls loop, roll, spin, collide and race down ramps to demonstrate the science of motion. Specially designed challenge activities stretch students' understandings of gravity, mass, friction, acceleration, and momentum.

ICM Speedway, Roller Coaster, Hit the Bucket, Rollways, and Loop the Loop are active games that encourage scientific experimentation. The principle of motion experiments formulated by Newton and Galileo centuries ago are very similar to the ones you will find in this exhibit. The Notion of Motion Focused Field Trip is a great supplement to classroom science units addressing how things move and reflects the Iowa CORE Curriculum Standards in the subject areas of science, mathematics, literacy, and 21st Century Skills.

FIELD TRIP OVERVIEW

Children are constantly having experiences with things that move. Young learners should develop an understanding that forces are responsible for changes in motion.

The Notion of Motion Focused Field Trip gives young learners concrete experiences with the concepts of gravity, friction, mass, forces, momentum, velocity, kinetic and potential energy in a meaningful context that stimulates creative problem solving.

15 minutes: Orientation to ICM

Students: "The Race" orientation

Adults: Brief Overview of Exhibit Activity Centers

75 minutes: Notion of Motion Activity Centers (small group rotations through four centers)

Center 1. ICM Speedway

Center 2. Roller Coaster

Center 3. Rollways

Center 4. Loop the Loop, Hit the Bucket

30 minutes: Free Exploration of ICM

Students will remain in their small groups for free exploration of the museum. Each group is required to be accompanied by a chaperone.

*Note: If your group arrives late for your scheduled field trip, this time block will be reduced.

Description of Activity Centers

ICM SPEEDWAY ACTIVITY CENTER

Big Ideas = speed, acceleration, momentum, weight, and mass

1. Each student is challenged to build a race car with the materials provided.

Challenge: Build a race car that travels the fastest to the finish line.

2. Time trials are conducted and races are timed by the chaperones using stop watches. Chaperones record race times on the ICM Race Cards.

3. Students may adjust their cars and race as long as time allows.

ROLLER COASTER ACTIVITY CENTER

Big Ideas = making and testing predictions, collecting mathematical data, graphing, cooperation, potential and kinetic energy

1. Each student ties an apron around their waist and fills it with ten golf balls
2. Each student predicts how many of the total balls in their small group will land in the red box at the end of the roller coaster.
3. Individual students go to the top of the roller coaster to release their golf balls while their group members sit on the floor in front of each valley and place the released ball in the corresponding roller coaster valley bucket.
4. After all balls have been released, students count the balls that landed in each valley and check the data against their predictions.
5. Both predictions and real data are recorded by the chaperone on the ICM Race Card.

ROLLWAYS ACTIVITY CENTER

Big Ideas = friction, acceleration, inclined planes, time, and cooperation

1. Students work in teams of two on each side of rollways to build a track system using panels and test their design.

Challenge: Make a track that takes the golf ball the longest amount of time to travel from the top of rollways to the bottom.

2. Electronic timers triggered by students give the elapsed time for each time trial.
3. Students are encouraged to do several time trials, making changes to their track to increase the ball's travel time.
4. Time trials are recorded on the ICM Race Card for further classroom use.

TWO TRACKS ACTIVITY CENTER

Big Ideas = acceleration, mass, weight, inclined planes, cooperation, potential and kinetic energy

LOOP THE LOOP

Challenge: Find a way to make two balls fly off parallel ramps at the same exact time.

HIT THE BUCKET

Challenge: Find a way to make the golf ball go down the ramp and land in the rotating bucket.

Anchor Standards and Essential Skills Incorporated in Notion of Motion

Iowa CORE Curriculum Areas:	Grades K-2	Grades 3-5
English Language Arts & Literacy:		
<u>Speaking and Listening</u>	<ul style="list-style-type: none"> • Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on other’s ideas and expressing their own clearly and persuasively. • Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. 	<ul style="list-style-type: none"> • Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on other’s ideas and expressing their own clearly and persuasively. • Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
Mathematics:		
<u>Counting and Cardinality</u>	<ul style="list-style-type: none"> • Know number names and the count sequence. • Count to tell the number of an object. • Compare numbers. 	
<u>Operations & Algebraic Thinking</u>	<ul style="list-style-type: none"> • Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 	
<u>Number and Operations</u>	<ul style="list-style-type: none"> • Understand place value. 	<ul style="list-style-type: none"> • Develop understand on fractions as numbers.
<u>Measurement and Data</u>	<ul style="list-style-type: none"> • Describe and compare measurable attributes. • Represent and interpret data. • Measure and estimate lengths in standard units. 	
Science		
<u>Science as Inquiry</u>	<ul style="list-style-type: none"> • Ask questions about objects, organisms, and events in the environment. • Plan and conduct simple investigations. • Use data to construct reasonable explanations. • Communicate investigations and explanations. 	<ul style="list-style-type: none"> • Identify and generate questions that can be answered through scientific investigations. • Recognize that scientists perform different types of investigations. • Plan and conduct scientific investigations. • Incorporate mathematics in science inquiries. • Use evidence to develop reasonable explanations. • Follow appropriate safety procedures when conducting investigations.
<u>Physical Science</u>	<ul style="list-style-type: none"> • Understand and apply knowledge of the positions and motions of objects. 	<ul style="list-style-type: none"> • Understand and apply knowledge of how forces are related to an object’s motion.

21st Century Skills		
<u>Employability Skills</u>	<ul style="list-style-type: none"> • Communicate and work appropriately with others to complete tasks. • Recognize different roles and responsibilities and is open to change. • Learn leadership skills and demonstrate integrity, ethical behavior, and social responsibility. • Develop initiative and demonstrate self-direction in activities. • Work productively and are accountable for their actions. 	<ul style="list-style-type: none"> • Communicate and work productively with others emphasizing collaboration and cultural awareness to produce quality work. • Adjust to various roles and responsibilities and understand the need to be flexible to change. • Practice leadership skills, and demonstrate integrity, ethical behavior, and social responsibility in all activities. • Demonstrate initiative, creativity, self-direction, and entrepreneurial thinking to produce successful outcomes. • Demonstrate productivity and accountability by producing quality work.
<u>Financial Literacy</u>	<ul style="list-style-type: none"> • Demonstrate the ability to set goals based on wants and needs. • Identify monetary resources and distribution options for those resources. • Demonstrate an understanding of the concept of credit. • Recognize various ways to save and the reasons individuals decide to save. • Distinguish between appropriate spending choices. 	<ul style="list-style-type: none"> • Create long and short term goals based on prioritization of wants and needs. • Recognize how one's personal career choice and attitude can impact financial planning decisions.

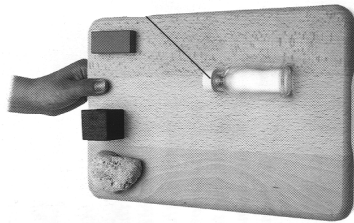
NOTION OF MOTION PRE-VISIT ACTIVITY 1

FRICTION RAMP SCIENCE INQUIRY ACTIVITY

Question: Do all objects move the same way down an inclined plane?

Target Concept: When an object moves down a ramp (inclined plane), it rubs against the surface of the ramp, creating friction. Friction slows down the moving object. Some surfaces create more friction than others.

Materials: Wooden cutting board Wooden block Rock
 Small glass bottle Eraser



Directions:

1. Place the objects in a line at the top of the wooden cutting board.
2. Ask students to predict what will happen when you tilt the board up.
3. Slowly begin to tilt the board up to create a ramp. The objects will begin to slide down the ramp, one at a time.

What's Happening?

Friction affects how fast an object slides down a ramp. The rough surface of the rock creates more friction with the board than the glass bottle or the wooden block. It therefore moves more slowly down the board. The eraser moves the slowest because its surface creates the most friction with the board.

Want to Do More?

The next time you're out on the playground, slide down the slide. Does what you're wearing make a difference in how fast or slow you go? Try to predict which of your classmates will slide down the fastest. Will it be the person wearing blue jeans or the person in the slick running pants?

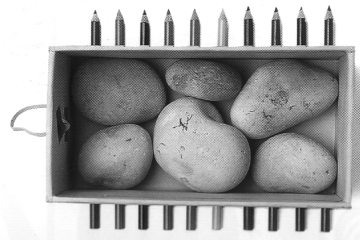
NOTION OF MOTION PRE-VISIT ACTIVITY 2

KEEP ON ROLLING SCIENCE INQUIRY ACTIVITY

Question: How can you reduce friction to make objects move more easily?

Target Concept: Friction builds up when you add weight to an object. To decrease friction, the surface area of the objects in contact must be reduced.

Materials: Toothpick Scissors Rubber band
Rocks MaskingTape Shoe Box
Rounded Pencils (12 or more)



Directions:

1. Cut a small hole in one end of the shoebox and push the rubber band through the hole. Loop it around the toothpick and tape it in place so that you have a “handle” to pull the shoebox.
2. Ask students to place the shoebox on a smooth tabletop. Pull the rubber band. You will find that the box moves very easily.
3. Fill the box with rocks and try pulling again. The rubber band stretches taut this time and is much, much harder to pull. (Friction increases as the box becomes heavier and presses harder on the table).
4. Now place a line of pencils on the table. Set the box full of rocks on top of the pencils.
5. Try to pull the box. This time the heavy box moves more easily because the pencils reduce the friction between the box and the table.

What’s Happening?

The pencils decrease friction by decreasing the surface area of the box in contact with the table.

NOTION OF MOTION POST-VISIT ACTIVITY

MAKE A RACE GRAPH

During your Notion of Motion Focused Field Trip, your chaperones collected information on the “ICM Race Card” from two of the activity centers.

Now you can use that data to make a graph about how things move.

Graphs make it easy to show information. A graph reveals two kinds of information: the facts being considered and the results of an investigation.

With the data your students collected during your field trip to The Iowa Children’s Museum, you now have the results of two investigations to use in making graphs that give information about how things move.

- **ROLLWAYS ACTIVITY CENTER**
- **ROLLER COASTER ACTIVITY CENTER**

LETTER TO CHAPERONES

Dear Parent/Caregiver Chaperones,

Thank you so much for being a part of the field trip experience to The Iowa Children's Museum. Chaperones are a very important part of the Focused Field Trip experience. To prepare you for a highly interactive, fun field trip we've prepared a few notes for you to review before you visit.

- Your child's teacher will divide the class into four small groups before your visit.
- You will be assigned to a small group.
- Your Duties as the official "Race Card Keeper" will be:
 1. Travel to exhibit activity centers with your small group.
You'll spend approximately 15 minutes at each of four different centers.
 2. Help to facilitate student interaction with the activities.
See separate "Chaperone Instructions" for details.
 3. Record race outcomes and times trials for your group on the ICM Race Card.

As chaperones, you will be provided with everything that you'll need to feel comfortable with your role during the field trip, but if you have any questions please call your classroom teacher or Nicole Palmer, Community Relations Coordinator at the Iowa Children's Museum (319) 625-6255, ext. 216.

"The evidence is now beyond dispute. When schools work together with families to support learning, children tend to succeed not just in school, but throughout life."

-From The Family is Critical to Student Achievement, Nat'l Committee for Citizens in Education.

The Iowa Children's Museum is working to help provide meaningful opportunities for parents and families to engage in their child's informal learning experiences. Thank you for your support!

Nicole Palmer
Community Relations Coordinator

ATTENTION BUS DRIVERS!

IMPORTANT INFORMATION

REGARDING YOUR FIELD TRIPS TO THE IOWA CHILDREN'S MUSEUM IN THE CORAL RIDGE MALL, CORALVILLE, IOWA

**The Coral Ridge Mall requires ALL buses to park on the
Northeast section of the Coral Ridge Mall
parking lot by Best Buy.**

